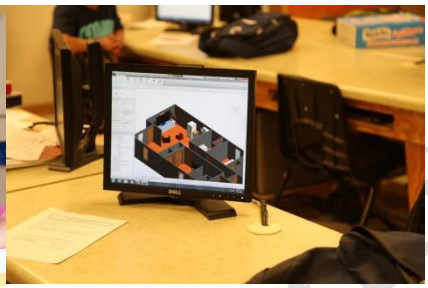
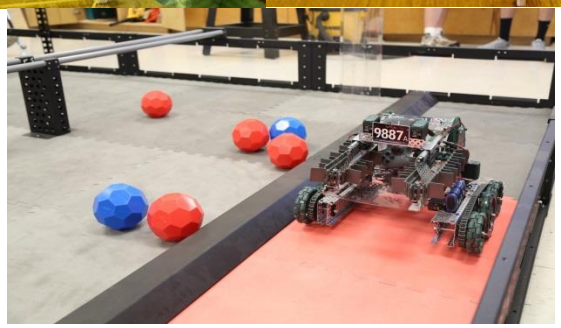
SUPPORT GUIDE FOR GRADE ONE SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS FOR SCIENCE

Molly M. Spearman
State Superintendent of Education

SOUTH CAROLINA
STATE DEPARTMENT
OF EDUCATION





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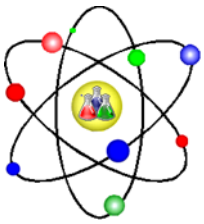


INTRODUCTION TO GRADE ONE STANDARDS

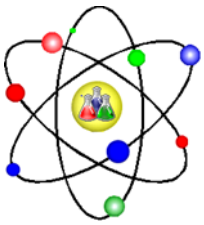
Science is a way of understanding the physical universe using observation and experimentation to explain natural phenomena. Science also refers to an organized body of knowledge that includes core ideas to the disciplines and common themes that bridge the disciplines. This document, *South Carolina Academic Standards and Performance Indicators for Science*, contains the academic standards in science for the state's students in kindergarten through grade twelve.

ACADEMIC STANDARDS

In accordance with the South Carolina Education Accountability Act of 1998 (S.C. Code Ann. § 59-18-110), the purpose of academic standards is to provide the basis for the development of local curricula and statewide assessment. Consensually developed academic standards describe for each grade and high school core area the specific areas of student learning that are considered the most important for proficiency in the discipline at the particular level.

Operating procedures for the review and revision of all South Carolina academic standards were jointly developed by staff at the State Department of Education (SCDE) and the Education Oversight Committee (EOC). According to these procedures, a field review of the first draft of the revised South Carolina science standards was conducted from March through May 2013. Feedback from that review and input from the SCDE and EOC review panels was considered and used to develop these standards.

The academic standards in this document are not sequenced for instruction and do not prescribe classroom activities; materials; or instructional strategies, approaches, or practices. The *South Carolina Academic Standards and Performance Indicators for Science* is not a curriculum.



THE PROFILE OF THE SOUTH CAROLINA GRADUATE

The *2014 South Carolina Academic Standards and Performance Indicators for Science* support the *Profile of the South Carolina Graduate. The Profile of the South Carolina Graduate* has been adopted and approved by the South Carolina Association of School Administrators (SCASA), the South Carolina Chamber of Commerce, the South Carolina Council on Competitiveness, the Education Oversight Committee (EOC), the State Board of Education (SBE), and the South Carolina Department of Education (SCDE) in an effort to identify the knowledge, skills, and characteristics a high school graduate should possess in order to be prepared for success as they enter college or pursue a career. The profile is intended to guide all that is done in support of college- and career-readiness.

Profile of the South Carolina Graduate

World Class Knowledge

- Rigorous standards in language arts and math for career and college readiness
- Multiple languages, science, technology, engineering, mathematics (STEM), arts and social sciences

World Class Skills

- Creativity and innovation
- Critical thinking and problem solving
- Collaboration and teamwork
- Communication, information, media and technology
- Knowing how to learn

Life and Career Characteristics

- Integrity
- Self-direction
- Global perspective
- Perseverance
- Work ethic
- Interpersonal skills

Approved by SCASA Superintendent's Roundtable and SC Chamber of Commerce.

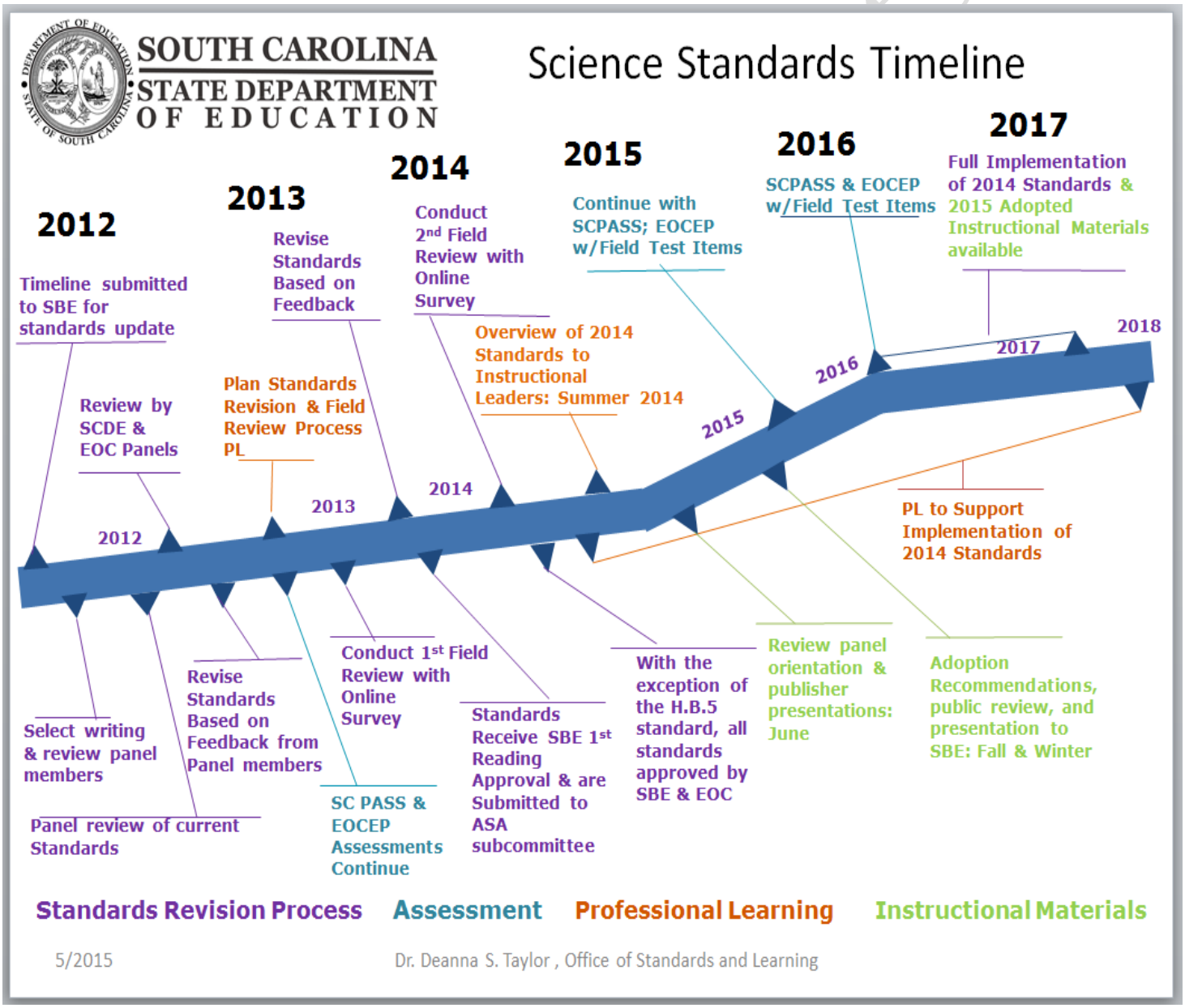
transformSC
tomorrow won't wait for our students

AN INITIATIVE OF SOUTH CAROLINA COUNCIL ON COMPETITIVENESS

SCIENCE STANDARDS TIMELINE

This timeline is used to illustrate the timeline for the standards revisions process, student assessment administration, provision of professional learning and the review and adoption of instructional materials. This timeline may be used with the science academic standards, science and engineering support document, and grade/content support documents to assist local districts, schools and teachers as they construct standards-based science curriculum, allowing them to add or expand topics they feel are important and to organize content to fit their students' needs and match available instructional materials.

The timeline in this document does not offer a sequence for instruction and do not prescribe classroom activities; materials; or instructional strategies, approaches, or practices. The *Science Standards Timeline*, is not a curriculum.



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CROSSCUTTING CONCEPTS

Seven common threads or themes are presented in *A Framework for K-12 Science Education* (2012). These concepts connect knowledge across the science disciplines (biology, chemistry, physics, earth and space science) and have value to both scientists and engineers because they identify universal properties and processes found in all disciplines. These crosscutting concepts are:

1. Patterns
2. Cause and Effect: Mechanism and Explanation
3. Scale, Proportion, and Quantity
4. Systems and System Models
5. Energy and Matter: Flows, Cycles, and Conservation
6. Structure and Function
7. Stability and Change

These concepts should not to be taught in isolation but reinforced in the context of instruction within the core science content for each grade level or course.

SCIENCE AND ENGINEERING PRACTICES

In addition to the academic standards, each grade level or high school course explicitly identifies S*cience and Engineering Practice* standards, with indicators that are differentiated across grade levels and core areas. The term "practice" is used instead of the term "skill," to emphasize that scientists and engineers use skill and knowledge simultaneously, not in isolation. These eight science and engineering practices are:

1. Ask questions and define problems
2. Develop and use models
3. Plan and conduct investigations
4. Analyze and interpret data
5. Use mathematical and computational thinking
6. Construct explanations and design solutions
7. Engage in scientific argument from evidence
8. Obtain, evaluate, and communicate information

Students should engage in scientific and engineering practices as a means to learn about the specific topics identified for their grade levels and courses. It is critical that educators understand that the Science and Engineering Practices are *not* to be taught in isolation. There should *not* be a distinct "Inquiry" unit at the beginning of each school year. Rather, the practices need to be employed *within the content* for each grade level or course.

Additionally, an important component of all scientists and engineers' work is communicating their results both by informal and formal speaking and listening, and formal reading and writing. Speaking, listening, reading and writing is important not only for the purpose of sharing results, but because during the processes of reading, speaking, listening and writing, scientists and engineers continue to construct their own knowledge and understanding of meaning and implications of their research. Knowing how one's results connect to previous results and what those connections reveal about the underlying principles is an important part of the scientific discovery process. Therefore, students should similarly be reading, writing, speaking and listening throughout the scientific processes in which they engage.

For additional information regarding the development, use and assessment of the *2014 Academic Standards and Performance Indicators for Science* please see the official document that is posted on the SCDE science web page--- http://tinyurl.com/2014SCScience.

DECIPHERING THE STANDARDS

KINDERGARTEN

LIFE SCIENCE: EXPLORING ORGANISMS AND THE ENVIRONMENT

Standard K.L.2: The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.

K.L.2A. Conceptual Understanding: The environment consists of many types of organisms including plants, animals, and fungi. Organisms depend on the land, water, and air to live and grow. Plants need water and light to make their own food. Fungi and animals cannot make their own food and get energy from other sources. Animals (including humans) use different body parts to obtain food and other resources needed to grow and survive. Organisms live in areas where their needs for air, water, nutrients, and shelter are met.

Performance Indicators: Students who demonstrate this understanding can:

K.L.2A.1 Obtain information to answer questions about different organisms found in the environment (such as plants, animals, or fungi).

K.L.2A.2 Conduct structured investigations to determine what plants need to live and grow (including water and light).

Figure 1: Example from the Kindergarten Standards

The code assigned to each performance indicator within the standards is designed to provide information about the content of the indicator. For example, the **K.L.2A.1** indicator decodes as the following--

- **K: The first part of each indicator denotes the grade or subject.** The example indicator is from Kindergarten. The key for grade levels are as follows—

  K: Kindergarten
  1: First Grade
  2: Second Grade
  3: Third Grade
  4: Fourth Grade
  5: Fifth Grade
  6: Sixth Grade
  7: Seventh Grade
  8: Eighth Grade
  H.B: High School Biology 1
  H.C: High School Chemistry 1
  H.P: High School Physics 1
  H.E: High School Earth Science

- **L: After the grade or subject, the content area is denoted by an uppercase letter.** The L in the example indicator means that the content covers Life Science. The key for content areas are as follows—
    - E: Earth Science
    - EC: Ecology
    - L: Life Science
    - P: Physical Science
    - S: Science and Engineering Practices

- **2: The number following the content area denotes the specific academic standard.** In the example, the 2 in the indicator means that it is within the second academic standard with the Kindergarten science content.

- **A: After the specific content standard, the conceptual understanding is denoted by an uppercase letter.** The conceptual understanding is a statement of the core idea for which students should demonstrate understanding. There may be more than one conceptual understanding per academic standard. The A in the example means that this is the first conceptual understanding for the standard. Additionally, the conceptual understandings are novel to the *2014 South Carolina Academic Standards and Performance Indicators for Science*.

- **1: The last part of the code denotes the number of the specific performance indicator.** Performance indicators are statements of what students can do to demonstrate knowledge of the conceptual understanding. The example discussed is the first performance indicator within the conceptual understanding.

CORE AREAS OF GRADE ONE

- Exploring Light and Shadows
- Exploring the Sun and Moon
- Earth's Natural Resources
- Plants and Their Environments

GRADE ONE
SCIENCE AND ENGINEERING PRACTICES

NOTE: Scientific investigations should always be done in the context of content knowledge expected at this grade level. The standard describes how students should learn and demonstrate knowledge of the content outlined in the other standards.

Standard 1.S.1: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

1.S.1A. Conceptual Understanding: The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.

Performance Indicators: Students who demonstrate this understanding can:

1.S.1A.1 Ask and answer questions about the natural world using explorations, observations, or structured investigations.

1.S.1A.2 Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

1.S.1A.3 With teacher guidance, conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.

1.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.

1.S.1A.5 Use mathematical and computational thinking to (1) recognize and express quantitative observations, (2) collect and analyze data, or (3) understand patterns and relationships.

1.S.1A.6 Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams.

1.S.1A.7 Construct scientific arguments to support claims or explanations using evidence from observations or data collected.

1.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations. Communicate observations and explanations clearly through oral and written language.

1.S.1B. Conceptual Understanding: Technology is any modification to the natural world created to fulfill the wants and needs of humans. The engineering design process involves a series of iterative steps used to solve a problem and often leads to the development of a new or improved technology.

Performance Indicators: Students who demonstrate this understanding can:

1.S.1B.1 Construct devices or design solutions to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the devices or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem, and (6) communicate the results.

PHYSICAL SCIENCE: EXPLORING LIGHT AND SHADOWS

Standard 1.P.2: The student will demonstrate an understanding of the properties of light and how shadows are formed.

1.P.2A. Conceptual Understanding: Objects can only be seen when light shines on them. Some materials allow light to pass through them; others allow only some light to pass through; and some do not allow any light to pass through and will create a shadow of the object. Technology such as mirrors can change the direction of a beam of light.

Performance Indicators: Students who demonstrate this understanding can:

1.P.2A.1 Obtain and communicate information to describe how light is required to make objects visible.

1.P.2A.2 Analyze and interpret data from observations to compare how light behaves when it shines on different materials.

1.P.2A.3 Conduct structured investigations to answer questions about how shadows change when the position of the light source changes.

1.P.2A.4 Develop and use models to describe what happens when light shines on mirrors based on observations and data collected.

EARTH SCIENCE: EXPLORING THE SUN AND MOON

Standard 1.E.3: The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.

1.E.3A. Conceptual Understanding: Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.

Performance Indicators: Students who demonstrate this understanding can:

1.E.3A.1 Use, analyze, and interpret data from observations to describe and predict seasonal patterns of sunrise and sunset.

1.E.3A.2 Use data from personal observations to describe, predict, and develop models to exemplify how the appearance of the moon changes over time in a predictable pattern.

1.E.3A.3 Obtain and communicate information to describe how technology has enabled the study of the Sun, the Moon, planets, and stars.

1.E.3A.4 Conduct structured investigations to answer questions about the effect of sunlight on Earth's surface.

1.E.3A.5 Define problems related to the warming effect of sunlight and design possible solutions to reduce its impact on a particular area.

EARTH SCIENCE: EARTH'S NATURAL RESOURCES

Standard 1.E.4: The student will demonstrate an understanding of the properties and uses of Earth's natural resources.

1.E.4A. Conceptual Understanding: Earth is made of different materials, including rocks, sand, soil, and water. An Earth material is a resource that comes from Earth. Earth materials can be classified by their observable properties.

Performance Indicators: Students who demonstrate this understanding can:

1.E.4A.1 Analyze and interpret data from observations and measurements to compare the properties of Earth materials (including rocks, soils, sand, and water).

1.E.4A.2 Develop and use models (such as drawings or maps) to describe patterns in the distribution of land and water on Earth and classify bodies of water (including oceans, rivers and streams, lakes, and ponds).

1.E.4A.3 Conduct structured investigations to answer questions about how the movement of water can change the shape of the land.

1.E.4B. Conceptual Understanding: Natural resources are things that people use that come from Earth (such as land, water, air, and trees). Natural resources can be conserved.

Performance Indicators: Students who demonstrate this understanding can:

1.E.4B.1 Obtain and communicate information to summarize how natural resources are used in different ways (such as soil and water to grow plants; rocks to make roads, walls, or buildings; or sand to make glass).

1.E.4B.2 Obtain and communicate information to explain ways natural resources can be conserved (such as reducing trash through reuse, recycling, or replanting trees).

LIFE SCIENCE: PLANTS AND THEIR ENVIRONMENTS

Standard 1.L.5: The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.

1.L.5A. Conceptual Understanding: Plants have specific structures that help them survive, grow, and produce more plants. Plants have predictable characteristics at different stages of development.

Performance Indicators: Students who demonstrate this understanding can:

1.L.5A.1 Obtain and communicate information to construct explanations for how different plant structures (including roots, stems, leaves, flowers, fruits, and seeds) help plants survive, grow, and produce more plants.

1.L.5A.2 Construct explanations of the stages of development of a flowering plant as it grows from a seed using observations and measurements.

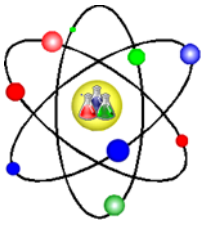
1.L.5B. Conceptual Understanding: Plants have basic needs that provide energy in order to grow and be healthy. Each plant has a specific environment where it can thrive. There are distinct environments in the world that support different types of plants. These environments can change slowly or quickly. Plants respond to these changes in different ways.

Performance Indicators: Students who demonstrate this understanding can:

1.L.5B.1 Conduct structured investigations to answer questions about what plants need to live and grow (including air, water, sunlight, minerals, and space).

1.L.5B.2 Develop and use models to compare how the different characteristics of plants help them survive in distinct environments (including deserts, forests, and grasslands).

1.L.5B.3 Analyze and interpret data from observations to describe how changes in the environment cause plants to respond in different ways (such as turning leaves toward the Sun, leaves changing color, leaves wilting, or trees shedding leaves).



GRADE ONE CROSSWALK FOR THE 2005 SOUTH CAROLINA SCIENCE ACADEMIC STANDARDS AND THE 2014 SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS FOR SCIENCE

ACKNOWLEDGEMENTS

SOUTH CAROLINA DEPARTMENT OF EDUCATION

The *Crosswalks for the South Carolina Academic Standards and Performance Indicators for Science* included in this document were developed under the direction of Dr. Julie Fowler, Deputy Superintendent, Division of College and Career Readiness and Cathy Jones Stork, Interim Director, Office of Standards and Learning.

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INTRODUCTION

This document, *Crosswalks for the 2005 South Carolina Science Academic Standards and the 2014 South Carolina Academic Standards and Performance Indicators for Science,* contains a comparison of the academic standards in science for the state's students in kindergarten through grade twelve.

HOW TO USE THE CROSSWALKS

This document may be used with the science academic standards, science and engineering support document, and grade/content support documents to assist local districts, schools and teachers as they construct standards-based science curriculum, allowing them to add or expand topics they feel are important and to organize content to fit their students' needs and match available instructional materials. 2005 and 2014 performance indicators that share similar content knowledge and skills that students should demonstrate to meet the grade level or high school course standards have been paired. These pairings have been organized into tables and are sequenced by the 2014 academic standards. The 2005 content indicators that do not match 2014 content have been placed at the end of each table.

The academic standards in this document are not sequenced for instruction and do not prescribe classroom activities; materials; or instructional strategies, approaches, or practices. The *Crosswalks for the 2005 South Carolina Science Academic Standards and the 2014 South Carolina Academic Standards and Performance Indicators for Science,* is not a curriculum.

GRADE 1 SCIENCE CROSSWALK DOCUMENT

(***** The 2005 content indicators that do not match 2014 content have been placed at the end of each table.)

2005	2014	Comments
Standard (Science & Engineering Practices)		
1-1: The student will demonstrate an understanding of scientific inquiry, including the processes, skills, and mathematical thinking necessary to conduct a simple scientific investigation.	**1.S.1:** The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.	In 2005 this standard and these indicators were referred to as "scientific inquiry"
Conceptual Understanding		
	1.S.1A. The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.	
Performance Indicators		
	1.S.1A.1 Ask and answer questions about the natural world using explorations, observations, or structured investigations.	This is a new expectation in 2014 standards
	1.S.1A.2 Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.	This is a new expectation in 2014 standards
1-1.2 Use tools (including rulers) safely, accurately, and appropriately when gathering specific data. **1-1.3** Carry out simple scientific investigations when given clear directions. **1-1.4** Use appropriate safety procedures when conducting investigations.	**1.S.1A.3** With teacher guidance, conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.	Collect qualitative and quantitative data is a new expectation in 2014 standards

1-1.1 Compare, classify, and sequence objects by number, shape, texture, size, color, and motion, using standard English units of measurement where appropriate.	**1.S.1A.4** Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.	
	1.S.1A.5 Use mathematical and computational thinking to (1) recognize and express quantitative observations, (2) collect and analyze data, or (3) understand patterns and relationships.	This is a new expectation in 2014 standards
	1.S.1A.6 Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams.	This is a new expectation in 2014 standards
	1.S.1A.7 Construct scientific arguments to support claims or explanations using evidence from observations or data collected.	This is a new expectation in 2014 standards
	1.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations. Communicate observations and explanations clearly through oral and written language.	This is a new expectation in 2014 standards
	Conceptual Understanding	
	1.S.1B. Technology is any modification to the natural world created to fulfill the wants and needs of humans. The engineering design process involves a series of iterative steps used to solve a problem and often leads to the development of a new or improved technology.	
	Performance Indicators	
	1.S.1B.1 Construct devices or design solutions to solve specific problems or needs: (1) ask questions to identify problems or needs, (2)	This is a new expectation in 2014 standards

	ask questions about the criteria and constraints of the devices or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem, and (6) communicate the results.	

2005	2014	Comments
	Standard (Physical Science)	
	1.P.2: The student will demonstrate an understanding of the properties of light and how shadows are formed.	This is a new topic for 1st grade
	Conceptual Understanding	
	1.P.2A. Objects can only be seen when light shines on them. Some materials allow light to pass through them; others allow only some light to pass through; and some do not allow any light to pass through and will create a shadow of the object. Technology such as mirrors can change the direction of a beam of light.	
	Performance Indicators	
	1.P.2A.1 Obtain and communicate information to describe how light is required to make objects visible.	This is a new expectation in 2014 standards
	1.P.2A.2 Analyze and interpret data from observations to compare how light behaves when it shines on different materials.	This is a new expectation in 2014 standards
	1.P.2A.3 Conduct structured investigations to answer questions about how shadows change when the position of the light source changes.	This is a new expectation in 2014 standards
	1.P.2A.4 Develop and use models to describe what happens when light shines on mirrors based on observations and data collected.	This is a new expectation in 2014 standards

2005	2014	Comments
	Standard (Earth Science)	
1-3: The student will demonstrate an understanding of the features of the sky and the patterns of the Sun and the Moon.	**1.E.3:** The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.	
	Conceptual Understanding	
	1.E.3A. Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.	
	Performance Indicators	
1-3.1 Compare the features of the day and night sky. **1-3.3** Recognize that the Sun and the Moon appear to rise and set.	**1.E.3A.1** Use, analyze, and interpret data from observations to describe and predict seasonal patterns of sunrise and sunset.	
1-3.4 Illustrate changes in the Moon's appearance (including patterns over time).	**1.E.3A.2** Use data from personal observations to describe, predict, and develop models to exemplify how the appearance of the moon changes over time in a predictable pattern.	
	1.E.3A.3 Obtain and communicate information to describe how technology has enabled the study of the Sun, the Moon, planets, and stars.	This is a new expectation in 2014 standards
1-3.2 Recall that the Sun is a source of heat and light for Earth.	**1.E.3A.4** Conduct structured investigations to answer questions about the effect of sunlight on Earth's surface.	
	1.E.3A.5 Define problems related to the warming effect of sunlight and design possible solutions to reduce its impact on a particular area.	This is a new expectation in 2014 standards

2005	2014	Comments
	Standard (Earth Science)	
1-4: The student will demonstrate an understanding of the properties of Earth materials.	**1.E.4:** The student will demonstrate an understanding of the properties and uses of Earth's natural resources.	
	Conceptual Understanding	
	1.E.4A. Earth is made of different materials, including rocks, sand, soil, and water. An Earth material is a resource that comes from Earth. Earth materials can be classified by their observable properties.	
	Performance Indicators	
1-4.1 Recognize the composition of Earth (including rocks, sand, soil, and water). **1-4.2** Classify rocks and sand by their physical appearance. **1-4.3** Compare soil samples by sorting them according to properties (including color, texture, and the capacity to nourish growing plants). **1-4.4** Recognize the observable properties of water (including the fact that it takes the shape of its container, flows downhill, and feels wet).	**1.E.4A.1** Analyze and interpret data from observations and measurements to compare the properties of Earth materials (including rocks, soils, sand, and water).	
1-4.5 Illustrate the locations of water on Earth by using drawings, maps, or models.	**1.E.4A.2** Develop and use models (such as drawings or maps) to describe patterns in the distribution of land and water on Earth and classify bodies of water (including oceans, rivers and streams, lakes, and ponds).	
	1.E.4A.3 Conduct structured investigations to answer questions about how the movement of water can change the shape of the land.	This is a new expectation in 2014 standards
	Conceptual Understanding	
	1.E.4B. Natural resources are things that people use that come from Earth (such as land, water, air, and trees). Natural resources can be	

	conserved.	
	Performance Indicators	
1-4.6 Exemplify Earth materials that are used for building structures or for growing plants.	**1.E.4B.1** Obtain and communicate information to summarize how natural resources are used in different ways (such as soil and water to grow plants; rocks to make roads, walls, or buildings; or sand to make glass).	
	1.E.4B.2 Obtain and communicate information to explain ways natural resources can be conserved (such as reducing trash through reuse, recycling, or replanting trees).	This is a new expectation in 2014 standards

2005	2014	Comments
	Standard (Life Science)	
1-2**:** The student will demonstrate an understanding of the special characteristics and needs of plants that allow them to survive in their own distinct environments.	**1.L.5:** The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.	
	Conceptual Understanding	
	1.L.5A. Plants have specific structures that help them survive, grow, and produce more plants. Plants have predictable characteristics at different stages of development.	
	Performance Indicators	
1-2.2 Illustrate the major structures of plants (including stems, roots, leaves, flowers, fruits, and seeds).	**1.L.5A.1** Obtain and communicate information to construct explanations for how different plant structures (including roots, stems, leaves, flowers, fruits, and seeds) help plants survive, grow, and produce more plants.	
1-2.4 Summarize the life cycle of plants (including germination, growth, and the production of flowers and seeds). **K-2.5** Recognize that all organisms go through stages of growth and change called life cycles.	**1.L.5A.2** Construct explanations of the stages of development of a flowering plant as it grow from a seed using observations and measurements.	Moved from Kindergarten
	Conceptual Understanding	
	1.L.5B. Plants have basic needs that provide energy in order to grow and be healthy. Each plant has a specific environment where it can thrive. There are distinct environments in the world that support different types of plants. These environments can change slowly or quickly. Plants respond to these changes in different ways.	
	Performance Indicators	
1-2.1 Recall the basic needs of plants (including air, water, nutrients, space, and light) for energy and growth.	**1.L.5B.1** Conduct structured investigations to answer questions about what plants need to live and grow (including air, water, sunlight, minerals, and space).	The emphasis in the 2014 indicator in contrast to the 2005 aligned indicator is for students to be actively engaged in science investigation (such as a class

		potting area) to gain understanding.
1-2.3 Classify plants according to their characteristics (including what specific type of environment they live in, whether they have edible parts, and what particular kinds of physical traits they have). **1-2.5** Explain how distinct environments throughout the world support the life of different types of plants. **1-2.6** Identify characteristics of plants (including types of stems, roots, leaves, flowers, and seeds) that help them survive in their own distinct environments.	**1.L.5B.2** Develop and use models to compare how the different characteristics of plants help them survive in distinct environments (including deserts, forests, and grasslands).	
	1.L.5B.3 Analyze and interpret data from observations to describe how changes in the environment cause plants to respond in different ways (such as turning leaves toward the Sun, leaves changing color, leaves wilting, or trees shedding leaves).	This is a new expectation in 2014 standards

CONTENT SUPPORT GUIDE
FOR GRADE ONE
SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS FOR SCIENCE

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SOUTH CAROLINA DEPARTMENT OF EDUCATION

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INTRODUCTION

Local districts, schools and teachers may use this document to construct standards-based science curriculum, allowing them to add or expand topics they feel are important and to organize content to fit their students' needs and match available instructional materials. The support document includes essential knowledge, extended knowledge, connections to previous and future knowledge, and assessment recommendations.

FORMAT OF THE CONTENT SUPPORT GUIDE

The format of this document is designed to be structurally uniformed for each of the academic standards and performance indicators. For each, you will find the following sections--

- **Standard**
  - This section provides the standard being explicated.
- **Conceptual Understanding**
  - This section provides the overall understanding that the student should possess as related to the standard. Additionally, the conceptual understandings are novel to the *2014 South Carolina Academic Standards and Performance Indicators for Science*.
- **Performance Indicator**
  - This section provides a specific set of content with an associated science and engineering practice for which the student must demonstrate mastery.
- **Assessment Guidance**
  - This section provides guidelines for educators and assessors to check for student mastery of content utilizing interrelated science and engineering practices.
- **Previous and Future Knowledge**
  - This section provides a list of academic content along with the associated academic standard that students will have received in prior or will experience in future grade levels. Please note that the kindergarten curriculum support document does not contain previous knowledge. Additionally, although the high school support document may not contain future knowledge, this section may list overlapping concepts from other high school science content areas.
- **Essential Knowledge**
  - This section illustrates the knowledge of the content contained in the performance indicator for which it is fundamental for students to demonstrate mastery.
- **Extended Knowledge**
  - This section provides educators with topics that will enrich students' knowledge related to topics learned with the explicated performance indicator.
- **Science and Engineering Practices**
  - This section lists the specific science and engineering practice that is paired with the content in the performance indicator. Educators should reference the chapter on this specific science and engineering practice in the *Science and Engineering Practices Support Guide.*

GRADE 1 SCIENCE CONTENT SUPPORT GUIDE

Standard
1.P.2 The student will demonstrate an understanding of the properties of light and how shadows are formed.

Conceptual Understanding
1.P.2A Objects can only be seen when light shines on them. Some materials allow light to pass through them; others allow only some light to pass through; and some do not allow any light to pass through and will create a shadow of the object. Technology such as mirrors can change the direction of a beam of light.

Performance Indicator
1.P.2A.1 Obtain and communicate information to describe how light is required to make objects visible.

Assessment Guidance
The objective of this indicator is to *obtain and communicate* information to describe how light is required to make objects visible. Therefore, the primary focus of assessment should be for students to *obtain information from informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations* to describe how light allows us to see objects. This could include but is not limited to students obtaining information using a variety of informational texts (videos, non-fiction books, etc…) as well as conducting investigations using flashlights to view objects in a dark room and having a class discussion to describe how light is needed to make objects visible.

In addition to *obtain and communicate* information, students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models; and construct devices or design solutions*.

Previous and Future Knowledge
- 4.P.4A.3 – Visibility of object related to light

Essential Knowledge
Basic properties of visible light:
- In order for an object to be visible, it must either give off its own light (be a source of light) or it must reflect light.
- If there is no light, then it is impossible to see an object.
- The Sun, a candle flame, or a flashlight gives off visible light.
- The Moon and many objects around us reflect light in order to be seen.

*SCIENTIFIC TOOLS used to describe how light is required to make objects visible include flashlights.

Extended Knowledge
- The intensity of light, or brightness, is related to the amount of light being seen. The closer the source of light is, the greater the brightness. “White light” is made up of many different colors. Objects absorb some light waves and reflect some light waves.

Science and Engineering Practices
S.1A.8

Standard
1.P.2 The student will demonstrate an understanding of the properties of light and how shadows are formed.

Conceptual Understanding
1.P.2A Objects can only be seen when light shines on them. Some materials allow light to pass through them; others allow only some light to pass through; and some do not allow any light to pass through and will create a shadow of the object. Technology such as mirrors can change the direction of a beam of light.

Performance Indicator
1.P.2A.2 Analyze and interpret data from observations to compare how light behaves when it shines on different materials.

Assessment Guidance
The objective of this indicator is to *analyze and interpret* data from observations to compare how light behaves when it shines on different materials. Therefore, the primary focus of assessment should be for students to *analyze and interpret data from observations, measurements, or investigations*, to understand patterns and meanings about how light behaves when it shines on different materials. This could include but is not limited to students using written observations and drawings from observations to compare how light behaves when passing through clear plastic (transparent), wax paper (translucent), and cardboard (opaque) materials.

In addition to *analyzing and interpreting* data, students should be asked *to ask questions; plan and carry out investigations; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models; obtain, evaluate, and communicate information; and construct devices or design solutions.*

Previous and Future Knowledge
- 2.P.3, 3.P.2 Properties of matter
- 4.P.4A.4; 4.P.4A.5 – Light interacting when it strikes an object or a variety of materials
- H.P.3F.2 – Light interacting with various objects

Essential Knowledge
Light behaves differently when it strikes different types of materials.
Some materials allow light to pass through them.
- Objects can be seen clearly when viewed through materials that allow light to pass through.
- Air, glass, and water are examples of these materials.

Some materials allow only some light to pass through.
- Objects appear as blurry shapes when viewed through materials that only allow some light to pass through.
- Waxed paper and frosted glass are examples of materials that allow some light to pass through.

Some materials do not allow any light to pass through.
- Wood, metals, and cardboard are examples of materials that do not allow any light to pass through.

*SCIENTIFIC TOOLS used to compare how light behaves includes flashlights.

Extended Knowledge
- Students could use the terms transparent, translucent, or opaque as an extension of this knowledge.

Science and Engineering Practices
S.1A.4

Standard
1.P.2 The student will demonstrate an understanding of the properties of light and how shadows are formed.

Conceptual Understanding
1.P.2A Objects can only be seen when light shines on them. Some materials allow light to pass through them; others allow only some light to pass through; and some do not allow any light to pass through and will create a shadow of the object. Technology such as mirrors can change the direction of a beam of light.

Performance Indicator
1.P.2A.3 Conduct structured investigations to answer questions about how shadows change when the position of the light source changes.

Assessment Guidance
The objective of this indicator is to *conduct structured investigations* to answer questions about how shadows change when the position of the light source changes. Therefore, the primary focus of assessment should be for students to *conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to make qualitative observations and take nonstandard measurements, and (4) record and represent data in an appropriate form while using appropriate safety procedures* to show that the position of the light source affects the size and location of a shadow. This could include but is not limited to students asking questions and making predictions about shadows and conducting structured investigations to determine how to make the shadow of an object larger and how to make the shadow move to a different location.

In addition to *conducting structured investigations*, students should *ask questions; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; develop and use models; obtain, evaluate, and communicate information; and construct devices or design solutions*.

Previous and Future Knowledge
- 4.E.3B.3 – Shadow observations

Essential Knowledge
The position of a light source affects the appearance of a shadow. Shadows change size and location depending on the position of the light source.
Light travels in a straight line away from a light source until an object blocks it. When an object blocks light, the object casts a shadow.

- When the *distance* between the light source and an object changes, the *size* of the shadow changes
- When the *position* of the light source to the object changes, the *location* of the shadow changes.
- This can be observed over the course of a sunny day by measuring and observing the size and position of the shadows cast by objects outside.

***** NOTE: When conducting the structured investigations, students will discover how the position and location of the light source affects the shadow of an object. This information is included for teacher reference during the facilitation of student discovery. Students should explore and discover the following:

- Shadows grow larger as the light source moves toward an object.
- Shadows grow smaller as the light source moves away from an object.

- When the light source shines down from directly above the object; there will be a very small shadow or no shadow at all. For example, when the Sun is directly overhead, trees cast short shadows or no shadow at all.
- Moving the light source up (from the bottom to the top) in front of an object causes the shadow to grow shorter.
- Moving the light source down (from the top to the bottom) in front of an object causes the shadow to grow taller.
- Moving the light source to the left causes the shadow to move to the right.
- Moving the light source to the right causes the shadow to moves to the left.

*****SCIENTIFIC TOOLS used to investigate shadows include flashlights**.**

Extended Knowledge

- The *shape* of the shadow of an object can change depending on the angle of the light source and the shape of the object. For example, a pumpkin with a stem will produce a round shadow if the light source is located near the bottom of the pumpkin. Moving the light source toward the top of the pumpkin will produce a shadow that is round and includes a stem.

Science and Engineering Practices
S.1A.3

Standard
1.P.2 The student will demonstrate an understanding of the properties of light and how shadows are formed.

Conceptual Understanding
1.P.2A Objects can only be seen when light shines on them. Some materials allow light to pass through them; others allow only some light to pass through; and some do not allow any light to pass through and will create a shadow of the object. Technology such as mirrors can change the direction of a beam of light.

Performance Indicator
1.P.2A.4 Develop and use models to describe what happens when light shines on mirrors based on observations and data collected.

Assessment Guidance
The objective of this indicator is to *develop and use models* to describe what happens when light shines on mirrors based on observations and data collected. Therefore, the primary focus of assessment should be for students to *develop and use models to understand or represent phenomena, processes, and relationships and to communicate ideas to others* to illustrate that light travels in a straight line and that mirrors can change the direction of a beam of light. This could include but is not limited to students conducting investigations with flashlights and mirrors in order to develop a diagram that illustrates how a beam of light can be redirected toward a given direction by using mirrors.

In addition to *developing and using models*, students should be asked to *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; obtain, evaluate, and communicate information; and construct devices or design solutions.*

Previous and Future Knowledge

- 4.P.4A.4 – Interaction of light with an object; reflection
- 8.P.3A.3 – Behavior of waves; reflection
- H.P.3F.2 – Interaction of light on a mirror

Essential Knowledge

Light travels in a straight line away from the light source. Mirrors can change the direction of a beam of light.

Mirrors

- A *mirror* (plane/flat) is a tool that reflects light.
- Mirrors can be used to redirect light toward a given direction.
- *Mirrors* can also be used to see around corners and behind you.

Reflection

- When light strikes a mirror, it is reflected.
- When light is *reflected*, it bounces back from a surface.
- When light bounces off a mirror, the direction of the light changes.

*NOTE: A mirror is a tool that can be used to reflect light. However, all visible objects reflect some light. Students may have misconceptions that only mirrors or shiny objects reflect light.

*SCIENTIFIC TOOLS that can be used to investigate what happens when light shines on mirrors include mirrors and flashlights.

Extended Knowledge

- Images reflected in a mirror are different from the actual object. Mirror images are actually reversals of the image.
- Curved mirrors can be used to magnify or reduce the size of images reflected by them.

Science and Engineering Practices

S.1A.2

Standard

1.E.3 The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.

Conceptual Understanding

1.E.3A Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.

Performance Indicator

1.E.3A.1 Use, analyze, and interpret data from observations to describe and predict seasonal patterns of sunrise and sunset.

Assessment Guidance

The objective of this indicator is to *analyze and interpret data* from observations to describe and predict seasonal patterns of sunrise and sunset. Therefore, the primary focus of assessment should be for students to *analyze and interpret data from observations* of the seasonal patterns of sunrise and sunset, determining that Earth rotates, causing the Sun to appear to rise and set. This could include but is not limited to students creating

an observation journal including what is seen during day sky to describe and predict the seasonal patterns of sunset and sunrise.

In addition to *analyzing and interpreting data*, students should *ask questions; develop and use models; plan and carryout investigations; use mathematical and computational thinking; engage in scientific argument from evidence; construct explanations; obtain, evaluate, and communicate information; construct devices or design solutions*

Previous and Future Knowledge

- 2.E.2A.2 – Seasonal patterns over time
- 8.E.4B.3 Explain how seasons, caused by the tilt of the earth's axis as it orbits the sun

Essential Understanding

- It is essential for students to know that the Earth turns (rotates) and the Sun appear to rise and set.
- The Sun appears to move across the sky during the day. It is lower in the sky in the morning (sunrise) and in the evening (sunset).
- Day sky: The day sky is when there is enough light from the Sun to see. Examples of features found in the day sky might include the Sun, the moon, clouds, birds, or airplanes.
- The Sun is the only star seen in the day sky.
- Sunrise and sunset do not occur at the same times during the year and do not occur at the same times at other locations in the world.

NOTE TO TEACHER: This may be an appropriate opportunity for students to collect, organize, and represent data using picture graphs or tallies and then to draw conclusions from the representations.

Extended Knowledge

- A sundial is a device that can be utilized to tell time by the position of the sun.
- The sun's position in the sky affects the size of shadows.

Science and Engineering Practices
S.1A.4

Standard
1.E.3 The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.

Conceptual Understanding
1.E.3A Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.

Performance Indicator
1.E.3A.2 Use data from personal observations to describe, predict, and develop models to exemplify how the appearance of the Moon changes over time in a predictable pattern

Assessment Guidance
The objective of this indicator is to use data from personal observations to *develop models* to show how the Moon changes over time in a predictable pattern. Therefore the primary focus of assessment should be for

students to use observational data to create a model to illustrate the patterns of the moon. This could include but is not limited to using models to communicate information as it pertains to the appearance of the moon as it changes over time in a predictable pattern.

In addition to *developing and using models*, students should *ask questions, plan and carryout investigations; analyze and interpret data; use mathematical and computational thinking; engage in scientific argument from evidence; construct explanations obtain, evaluate, and communicate information; construct devices or design solutions.*

Previous and Future Knowledge
There have been no previous standards or indicators pertaining to this standard and/or indicator.

- 4.E.3B.1 – Patterns in the location, movement, and appearance of the Moon
- 8.E.4B.1 - Characteristics and movements of objects (moon) in the solar system

Essential Understanding

- The Moon's appearance changes over time.
- The Moon is a ball of rock that moves around Earth.
- The Moon goes around earth about once every month.
- The Moon does not make its own light.
- The Moon can be seen because the sun's light shines on it.
- As the Moon moves around Earth, it appears to change shape. For example, we can see the entire Moon, part of the Moon, or none of the Moon.
- The appearance of the Moon changes shape in a regular pattern each month

NOTE TO TEACHER: This may be an appropriate opportunity for students to collect, organize, and represent data using picture graphs or tallies and then to draw conclusions from the representations.

Extended Knowledge

- Create a moon calendar and record patterns over a month's time.
- Research and write facts about the moon.
- Create a chart showing phases of the moon.

Science and Engineering Practices
S.1A.2

Standard
1.E.3 The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.

Conceptual Understanding
1.E.3A Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.

Performance Indicator
1.E.3A.3 Obtain and communicate information to describe how technology has enabled the study of the Sun, the Moon, planets, and stars.

Assessment Guidance
The objective of this indicator is to *obtain and communicate information* to support explanations about the sun, moon, planets, and stars. Communicate observations and explanations using oral and written language. Therefore the primary focus of assessment should be for students to *obtain and communicate information* to describe how technology has enabled the study of the sun, moon, planets, and stars. This includes but is not limited to generating and answering scientific questions using sources of information and communicating the scientific information in an appropriate manner (orally, written, visually, and/or mathematically).

In addition to *developing and using models*, students should *ask questions; plan and carryout investigations; analyze and interpret data; use mathematical and computational thinking; engage in argument from evidence*; *construct explanations, develop and use models; construct devices or design solutions.*

Previous and Future Knowledge
- 8.E.4B.5 - Describe how data from technologies provide information about objects in the solar system

Essential Understanding
- Powerful telescopes can be used to learn about the sun, moon, planets, and stars.
- Man-made satellites are machines that are launched by rockets into space and are used by scientist to study the sun, moon, planets, and stars.
- Some man-made satellites take pictures of the sun, moon, planets, and stars.

Extended Knowledge
- Satellites come in many shapes and sizes.
- They contain two basic parts; an antennae and a power source

Science and Engineering Practices
S.1A.8

Standard
1.E.3 The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.

Conceptual Understanding
1.E.3A Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.

Performance Indicator
1.E.3A.4 Conduct structured investigations to answer questions about the effect of sunlight on Earth's surface.

Assessment Guidance
The objective of this indicator is to *conduct structured investigations to answer questions* about the effect of sunlight on the Earth's surface. Therefore the primary focus of assessment should be for students to *conduct structured investigations* to answer specific questions and develop explanations using appropriate tools to make qualitative measurements about how the sun affects the Earth's surface. This includes but is not limited to a structured investigation based on questions generated about the Sun's heat and light energy and the affects it has on Earth's surfaces (i.e., land and water.)

In addition to *conducting structured investigations and asking questions*, students should *analyze and interpret data, use mathematical and computational thinking, engage in argument from evidence, construct explanations, develop and use models, obtain, evaluate, and communicate information; construct devices or design solutions.*

Previous and Future Knowledge

- 8.E.4B.3 – Seasons affects the amount of heating on Earth's surface

Essential Understanding

The Sun is a star in the daytime sky that provides energy in the form of heat and light.

- The heat from the Sun provides warmth for Earth's surfaces.
- Without the Sun, Earth would be too cold to live on.
- Plants need the light from the Sun so that they can make their own food.
- To measure the effects of sun's heat on earth's materials. For example: soil (warmth of soil enables growth for plants) and water.

Extended Knowledge

- Conduct structured investigations to answer questions about three different areas and try to determine the effect of sunlight on that particular areas

Science and Engineering Practices

S.1A.3

Standard

1.E.3 The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.

Conceptual Understanding

1.E.3A Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.

Performance Indicator

1.E.3A.5 Define problems related to the warming effect of sunlight and design possible solutions to reduce its impact on a particular area

Assessment Guidance

The objective of this indicator is to *construct devices or design a solution* to reduce the impact of the warming effect of sunlight on a particular area. Therefore, the primary focus of assessment should be to solve specific problems or needs relating to the warming effect of sunlight. Students should *ask questions to identify the problem, generate and communicate ideas for possible solutions, test solutions, determine if the solutions solved the problem and communicate their results*. This includes but is not limited to designing a solution to help keep ice cream from melting on a warm day, and then testing some of their solutions.

In addition to *obtaining, evaluating, and communicating information*, students should *ask questions; plan and carryout investigations; analyze and interpret data; use mathematical and computational thinking; engage in argument from evidence; construct explanations; develop and use models; construct devices or design solutions.*

Previous and Future Knowledge

- H.E.5A.2 – The angle of solar incidence impact the distribution of sunlight in any location

Essential Understanding

The sun provides warmth and light to Earth's surfaces. If an area is shielded from the sun, the temperature effect will be less.

Extended Knowledge

- Test solutions and redesign solutions based on test results.

Science and Engineering Practices

S.1B.1

Standard

1.E.4 The student will demonstrate an understanding of the properties and uses of Earth's natural resources.

Conceptual Understanding

1.E.4A Earth is made of different materials, including rocks, sand, soil, and water. An Earth material is a resource that comes from Earth. Earth materials can be classified by their observable properties

Performance Indicator

1.E.4A.1 Analyze and interpret data from observations and measurements to compare the properties of Earth materials (including rocks, soils, sand, and water).

Assessment Guidance

The objective of this indicator is to *analyze and interpret data* from observations and measurements to compare the properties of Earth materials (including rocks, soils, sand, and water). Therefore, the primary focus of assessment should be for students to *analyze and interpret data* from informational texts, or *perform investigations* using a range of methods (such as tabulation or graphing) to reveal patterns and construct meaning, or support hypotheses, explanations, claims, or designs. This could include, but is not limited to students collecting different Earth materials, including rocks, soil, sand and water, and comparing and contrasting their findings. Furthermore, students could analyze their data findings and draw illustrations in their journal and write their detailed observations of each.

In addition to *analyzing and interpreting data*, students should *ask questions*; *develop and use models; plan and carryout investigations; use mathematical and computational thinking; engage in scientific argument from evidence; construct explanations; obtain, evaluate, and communicate information; construct devices or design solutions.*

Previous and Future Knowledge

- 3.E.4A.1 – Earth materials; rocks, minerals, and soil
- H.E.3A.5 - Physical and chemical properties of minerals and rocks

Essential Knowledge

Students need to know that Earth is made of different materials, including rocks, sand, soil, and water. An Earth material is defined as a resource that comes from Earth. Types of Earth materials include:

Rocks

- Rocks are hard, solid, nonliving materials that make up Earth.
- Rocks come in many different shapes, sizes, and colors and can be classified into different groups based on similar characteristics.
- Know that rocks and sand can be classified by their physical appearance.
- Examples of physical appearances used to classify rocks and sand might include color, size and shape, texture (rough or smooth), shiny or dull.

Sand

- Sand is made of tiny pieces of rock.

Soil

- Know that different soils have different properties. Soils can be sorted by color, texture, and the capacity to nourish growing plants.
- Soil is the loose, top layer of Earth's surface made up of pieces of rock, sand, water, air, and pieces of dead organisms.
- The type of soil used the most for supporting life is the topsoil.
- Soil is used to grow plants.

Water

- Water is one of our most valuable resources on Earth.
- Every living thing needs water to survive.
- Water covers most of Earth, but only a small portion of it can be used for drinking.
- It can be salt water or fresh water.
- Water is a liquid that takes the shape of its container. For example, water on Earth may be found in containers known as lakes, ponds, or oceans.
- Water will flow downhill. Water flows in streams and rivers toward the ocean.
- Water feels wet. Water is needed by all living things.

NOTE TO TEACHER: This may be an appropriate opportunity for students to collect, organize, and represent data using picture graphs or tallies and then to draw conclusions from the representations. Additionally, students may be required to order up to 3 objects by length using indirect comparison (i.e. sorting rocks from a distance).

Extended Knowledge

- Classification of rocks
- Layers of soil (soil profile)

Science and Engineering Practices:

S.1A.4

Standard

1.E.4 The student will demonstrate an understanding of the properties and uses of Earth's natural resources.

Conceptual Understanding

1.E.4A Earth is made of different materials, including rocks, sand, soil, and water. An Earth material is a resource that comes from Earth. Earth materials can be classified by observable properties.

Performance Indicator
1.E.4A.2 Develop and use models (such as drawings or maps) to describe patterns in the distribution of land and water on Earth and classify bodies of water (including oceans, rivers, stream, lakes, and ponds)

Assessment Guidance
The objective of this indicator is to *develop and use models* to understand the patterns in the distribution of land and water on Earth, and classify bodies of water, including oceans, rivers, streams, lakes and ponds. Therefore, the primary focus of assessment should be for students to *develop and use models* that represent an understanding of the relationships between water and land on Earth. This could include, but is not limited to using information (obtained through research or investigations) to develop and construct a functional or descriptive model that represents the phenomenon. For example, creating a model to show the physical arrangement of a part of Earth, including both land and water.

In addition to *developing and using models*, students should *ask questions; plan and carryout investigations; analyze and interpret data; use mathematical and computational thinking; engage in scientific argument from evidence; construct explanations; obtain, evaluate, and communicate information; construct devices or design solutions.*

Previous and Future Knowledge
- 3.E.4A.2 - Pattern distribution of land and water
- H.E.6 Salt vs. Fresh water, water availability on Earth, quality of water, convection currents of ocean

Essential Knowledge
- Classify bodies of water as freshwater or saltwater
- Compare and contrast different bodies of water (oceans vs. lakes, rivers vs. ponds, etc.)
- There are more bodies of water in comparison to the amount of continental land.

Extended Knowledge
- Classify other bodies of water, like, estuaries, swamps, etc.
- Differentiate between additional bodies of water

Science and Engineering Practices
S.1A.2

Standard
1.E.4 The student will demonstrate an understanding of the properties and uses of Earth's natural resources.

Conceptual Understanding
1.E.4A Earth is made of different materials, including rocks, sand, soil, and water. An Earth material is a resource that comes from Earth. Earth materials can be classified by observable properties.

Performance Indicator
1.E.4A.3 Conduct structured investigations to answer questions about how the movement of water can change the shape of the land.

Assessment Guidance
The objective of this indicator is to *carry out investigations* answer questions about how moving water can change the shape of the land. Therefore, the primary focus of assessment should be for students to *conduct*

investigations that represent an understanding of how the movement of water can change the shape of land. This could include, but is not limited to students conducting an investigation to see how water flows. For example, use a stream table or pie pan to investigate how water moves downhill and alters landforms; predict the results of a structured stream-table/pie pan investigation, and then compare actual results to predictions.

In addition to *carrying out investigations*, students should *ask questions; analyze and interpret data; use mathematical and computational thinking; engage in scientific argument from evidence; construct explanations; obtain, evaluate, and communicate information; construct devices or design solutions.*

Previous and Future Knowledge

- 5.E.3A.1 – Landforms resulting from water movement
- H.E.6A.6 – Groundwater affects limestone formation

Essential Knowledge

- Water is a liquid that takes the shape of its container. For example, water on Earth may be found in containers known as lakes, ponds, or oceans.
- Water will flow downhill. Water flows in streams and rivers toward the ocean.
- Running water is a major force that shapes the landscape of Earth.

Extended Knowledge

- Water can change from a solid to a liquid.

Science and Engineering Practices
S.1A.3

Standard
1.E.4 The student will demonstrate an understanding of the properties and uses of Earth's natural resources

Conceptual Understanding
1.E.4B Natural resources are things that people use that come from Earth (such as land, water, air, and trees). Natural resources can be conserved.

Performance Indicator
1.E.4B.1 Obtain and communicate information to summarize how natural resources are used in different ways (such as soil and water to grow plants; rocks to make roads, walls, or buildings; or sand to make glass).

Assessment Guidance
The objective of this indicator is to *obtain and communicate information* to summarize how natural resources are used in different ways. Therefore, the primary focus of assessment should be for students to *collect information* on natural resources and *summarize* the ways the natural resources are used. This could include but is not limited to students researching ways to use natural resources and summarizing the information they collected through a presentation (oral or poster).

In addition to *obtaining and communicating information*, students should *ask questions; plan and carryout investigations; analyze and interpret data; use mathematical and computational thinking; engage in scientific argument from evidence; construct explanations; construct devices or design solutions.*

Previous and Future Knowledge

- K.L.2A.2 – Plants need water to live and grow
- 1.L. 5B.1 – Plants need water, etc. to live and grow
- H.E.3B - Natural resources

Essential Knowledge

It is essential for students to know that Earth materials can be used for building structures or for growing plants. Examples of some ways that Earth materials can be used include:

Rocks Making roads, walls, or buildings

Sand Making glass, growing certain types of plants (for example a desert plant)

Soil Making bricks, growing certain types of plants (for example a forest plant)

Water Growing plants must take in water through their roots

But humans are not the only ones that use Earth materials. Birds use twigs, leaves, soil, and straw to make their homes and some insect homes are made from soil.

Extended Knowledge

- Types of specific Earth materials (for example granite, kaolin, slate).

Science and Engineering Practices

S.1.A.8

Standard

1.E.4 The student will demonstrate an understanding of the properties and uses of Earth's natural resources.

Conceptual Understanding

1.E.4B Natural resources are things that people use that come from Earth (such as land, water, air, and trees). Natural resources can be conserved.

Performance Indicator

1.E.4B.2 Obtain and communicate information to explain ways natural resources can be conserved (such as reducing trash through, reuse, recycling, or replanting trees).

Assessment Guidance

The objective of this indicator is to *obtain and communicate information* to explain the use of natural resources that come from Earth. Therefore, the primary focus of assessment should be for students to *communicate* how natural resources can be conserved through reducing trash, or replanting trees. This could include, but is not limited to understanding how to conserve natural resources, *generate and answer questions* related to conservation using above methods (or others), *develop models to support hypotheses, explanations, claims, or designs*. For example, students could communicate observations and explanations of conservation in a science journal.

In addition to *obtaining and communicating information*, students should *ask questions; develop and use models; plan and carryout investigations; analyze and interpret data; use mathematical and computational*

thinking; engage in scientific argument from evidence; construct explanations; construct devices or design solutions.

Previous/Future Knowledge

- 3.E.4B.4 – Human activity; reduce the impact on the environment
- 5.E.3B.4 – Reduce human impact on landforms and ocean shore zone

Essential Knowledge

Students should have a firm understanding of what the terms "natural resources" and "conservation" mean. Students should be able to sort and classify objects as trash and recyclables (plastic, paper, glass, etc.) It is also important to know that replanting trees after they have been cut down is important in soil restoration and preservation. Replanting trees is also important to replenish a natural resource.

Extended Knowledge

- Students will classify resources as renewable or nonrenewable.
- Students will learn about the different ways to obtain energy (wind, solar, water), electric cars.

Science and Engineering Practices

S.1.A.8

Standard

1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.

Conceptual Understanding

1.L.5A Plants have specific structures that help them survive, grow, and produce more plants. Plants have predictable characteristics at different stages of development.

Performance Indicator

1.L.5A.1 Obtain and communicate information to construct explanations for how different plant structures (including roots, stems, leaves, flowers, fruits, and seeds) help plants survive, grow, and produce more plants.

Assessment Guidance

The objective of this indicator is for students to *obtain and communicate information* to construct explanations for how different plant structures (including roots, stems, leaves, flowers, fruits, and seeds) help plants survive, grow, and produce more plants. Therefore, the primary focus of assessment should be for students to *obtain and evaluate informational texts, observations, data collected, or discussions* about how specific plant structures help plants survive, grow, and produce more plants. This could include but is not limited to students making observations of specific parts of live plants and recording observations in science journals.

In addition to *obtaining and communicating information and constructing explanations*, students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models*; and *construct devices or design solutions.*

Previous and Future Knowledge

- 4.L.5B.2 - Structural adaptations of plants (roots, stems, leaves, flowers, fruit, seeds)
- 6.L.5B.1 – Internal structures of plants transport food and water
- 6l.5B.3 – Structural adaptations that plants use for defense, survival, and reproduction

Essential Knowledge
There are different structures of plants (including roots, stems, leaves, flowers, fruits, and seeds). Each of these structures helps plants survive, grow, and produce more plants.

Stem - The part of the plant that grows out of the ground, supports the leaves, flowers, and fruit, and carries water from the roots to the rest of the plant

Root - The part of the plant that grows under the ground, holds the plant in place, and takes in water and nutrients from the ground

Leaf - The flat, usually green, part of the plant that grows from the stem and makes food for the plant

Flower - The part of the flowering plant that helps the plant make new plants like itself. It has special characteristics, such as color or scent, which attracts insects and makes the seeds

Fruit - The part of the flowering plant that grows from the flower and contains the seeds (Fruit forms around the seeds to protect them)

Seed - The part of the flowering plant that will grow into a new plant; seeds are usually covered with a protective coating (seed coat)

Extended Knowledge
Conduct structured investigations with teacher guidance to determine how plant structures help the plants survive, grow, and produce more plants

Science and Engineering Practices
S.1A.8

Standard
1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.

Conceptual Understanding
1.L.5A Plants have specific structures that help them survive, grow, and produce more plants. Plants have predictable characteristics at different stages of development.

Performance Indicator
1.L.5A.2 Construct explanations of the stages of development of a flowering plant as it grows from a seed using observations and measurements.

Assessment Guidance
The objective of this indicator is to *construct explanations* of the stages of development of a flowering plant as it grows from a seed using observations and measurements. Therefore, *the primary focus of assessment should be to construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams to explain* the stages of development of a flowering plant. This could include but is not limited to students observing and recording measurements of plant growth (using standard whole units) over a structured period of time,

organizing the data in a graph, table, or diagram, and constructing explanations of what occurs during each stage of development.

In addition to *constructing explanations,* students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; obtain, evaluate, and communicate information; develop and use models;* and *construct devices or design solutions.*

Previous and Future Knowledge

- 4.L.5A.2 Life cycle of plants

Essential Understanding

Plants have life cycles with distinct stages. A plant's life cycle describes the stages it goes through during its life, or how it germinates, grows, flowers, and makes seeds.

Germination

- The process in which a plant begins to sprout or grow from the seed

Growth

- The process of getting larger in size and developing from a seedling to a mature plant

Flowers

- the part of the plant that makes pollen
- flowers have to receive pollen to make seeds
- most flowers have special characteristics (color, scent) which attracts insects
- insects carry this pollen from flower to flower
- flowers make seeds deep inside

Seeds

- what flowering plants grow from
- contains the "baby" plant and the food it will need to grow

It is also essential for students to make observations (using the senses) and take measurements (in standard whole units) of a flowering plant to learn more about the plant's life cycle.

Extended Knowledge

Obtain and evaluate informational texts about the parts of a flower that make seeds, how seeds are produced, or reproduction from spores and communicate explanations using oral or written language.

Science and Engineering Practices

S.1A.6

Standard

1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.

Conceptual Understanding

1.L.5B Plants have basic needs that provide energy in order to grow and be healthy. Each plant has a specific environment where it can thrive. There are distinct environments in the world that support different types of plants. These environments can change slowly or quickly. Plants respond to these changes in different ways.

Performance Indicator
1.L.5B.1 Conduct structured investigations to answer questions about what plants need to live and grow (including air, water, sunlight, minerals, and space).

Assessment Guidance
The objective of this indicator is for students to *conduct structured investigations* to determine what plants need to live and grow. Therefore, the primary focus of assessment should be for students to *conduct structured investigations with teacher guidance to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Students should also use appropriate safety procedures*. This could include but is not limited to conducting an investigation in which specific plant needs are withheld from live plants and recording the results of the investigation in a science journal.

In addition to *conducting structured investigations*, students should be asked *to ask questions; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models; obtain, evaluate, and communicate information;* and *construct devices or design solutions.*

Previous and Future Knowledge
- K.L.2A.2 - Plants need water and light
- 4.L.5B.2 - Structural adaptations that allow plants to survive
- 6.L.5B.2 – Photosynthesis, respiration, & transpiration meet the needs of plants

Essential Knowledge
Plants have basic needs such as water and light in order to be able to make food. Plants then use the food to produce the energy needed in order to grow and make new plants like itself. The basic needs of a plant are:
Air
- Plants need air to make their own food and grow.

Water
- Plants need water to make their own food and grow.
- Too much water or too little water could cause the plant to die.

Sunlight
- Plants need sunlight to make their own food and grow.

Minerals
- Plants need minerals to help them grow and stay healthy.
- Minerals can be found in the soil or water.
- Just as with water, too many minerals or too few minerals could cause the plant to die.

Space
- Plants need a certain amount of space to grow.
- The space above the ground allows the plant to get the light and air it needs.
- The space below the ground allows the plant to get the water and minerals it needs through its roots.

If there are too many plants in a particular area, the plant may not get the materials it needs to grow.

Science and Engineering Practices
S.1A.3

Standard
1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.

Conceptual Understanding
1.L.5B Plants have basic needs that provide energy in order to grow and be healthy. Each plant has a specific environment where it can thrive. There are distinct environments in the world that support different types of plants. These environments can change slowly or quickly. Plants respond to these changes in different ways.

Performance Indicator
1.L.5B.2 Develop and use models to compare how the different characteristics of plants help them survive in distinct environments (including deserts, forests, and grasslands).

Assessment Guidance
The objective of this indicator is to *develop and use models* to compare how the different characteristics of plants help them survive in distinct environments (including deserts, forests, and grasslands). Therefore the primary focus of assessment should be to *develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others* about the characteristics of plants that help them survive in distinct environments. This could include but is not limited to students developing models of different distinct environments and labeling and discussing specific plant parts that help them survive in each environment.

In addition to *developing and using models,* students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; obtain, evaluate, and communicate information*; and *construct devices or design solutions.*

Previous and Future Knowledge
- K.L.2A.6 - Basic knowledge of plants
- 3.L.5A.1 - Environment supports a variety of organisms

Essential Knowledge
There are different environments around the world that support different types of plants. Different characteristics of plants help them survive in distinct environments (including deserts, forests, and grasslands).

A distinct environment is a special surrounding that supports the life of different plants. Plants can survive only in environments in which their needs can be met. The world has many distinct environments that support varied types of plants.
Deserts
- Some desert plants store water in their stems or leaves.
- Other plants may have especially long roots that spread out to reach as much water as possible.
- Cacti (the plural form of cactus) are one of the best known desert plants. Cacti are designed to store water from one rainfall to the next.
- Cacti have needle-like leaves to keep in moisture and to keep predators away.

Forests
- Forests have many trees (with needles or with leaves), shrubs, and grasses.
- Some trees lose their leaves in the winter when it is cold and often dry. (These are deciduous trees.) By

losing their leaves, they are able to conserve energy and water.
- Some trees have needle-like leaves with a waxy coating. This needle-like leaves help them hold in water and continue to make food in the winter.
- Some trees have thick bark to protect them from the cold.
- Many forest plants have large leaves so they can get plenty of sunlight.

Grasslands
- Grasses have long roots to soak up water deep in the ground. This also keeps animals from pulling out the roots when grazing.
- During a fire, the roots of many grasses survive so they can grow back quickly.
- Grasslands have many grasses that die every year. The grasses decay leaving nutrient-rich topsoil. Many grasses have flexible stems. This allows them to bend in the wind, instead of breaking.

Extended Knowledge
Learners may be introduced to characteristics of plant-life in other distinct environments not mentioned; additional characteristics of plant-life in these distinct environments.

Science and Engineering Practices
S.1A.2

Standard
1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.

Conceptual Understanding
1.L.5B Plants have basic needs that provide energy in order to grow and be healthy. Each plant has a specific environment where it can thrive. There are distinct environments in the world that support different types of plants. These environments can change slowly or quickly. Plants respond to these changes in different ways.

Performance Indicator
1.L.5B.3 Analyze and interpret data from observations to describe how changes in the environment cause plants to respond in different ways (such as turning leaves toward the Sun, leaves changing color, leaves wilting, or trees shedding leaves).

Assessment Guidance
The objective of this indicator is to *analyze and interpret data* from observations to describe how changes in the environment cause plants to respond in different ways (such as turning leaves toward the Sun, leaves changing color, leaves wilting, or trees shedding leaves). Therefore the primary focus of assessment should be to *analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings* to describe how changes in the environment cause plants to respond in different ways. This could include but is not limited to students making and recording observations of the leaves on one particular tree over a structured time period (e.g. from late summer to early autumn) and then analyzing the data to determine how that particular plant responds to a decrease in the amount of sunlight.

In addition to *analyzing and interpreting data*, students should *ask questions; plan and carry out investigations; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models; obtain, evaluate, and communicate information*; and *construct devices or design solutions.*

Previous Knowledge

- 6.L.5B.4 – Changes in the environment affect growth & development of plants

Essential Knowledge

Each type of plant has an environment in which it can thrive. An environment refers to the surroundings of living things (air, water, soil, plants, and animals).
These environments can change slowly or quickly. Plants respond to these changes in different ways.

- Some plants have leaves that turn toward the Sun so they can get the most sunlight possible.
- Some plants have leaves that wilt when they get too hot or when the plant does not get enough water.
- In the autumn, some leaves change color. In winter, some trees shed their leaves.

NOTE TO TEACHER: This may be an appropriate opportunity for students to collect, organize, and represent data using picture graphs or tallies and then to draw conclusions from the representations.

Extended Knowledge

Learners may be introduced additional plant responses to environmental changes such as too much rainfall, the lack of nutrients, or survival when animals are eating the plants.

Science and Engineering Practices

S.1A.4